

REMARKS

Claims 1-7, 10-23, 25 and 27-34 were previously pending in this application. Claims 1, 3-5, 15, 17, 18, 20, 25 and 30-33 have been amended. Claims 2, 16, and 27 have been cancelled. As a result, claims 1, 3-7, 10-15, 17-23, 25, and 28-34 are pending for examination with claims 1, 20, and 25 being independent claims. Amendments to the claims can be found throughout the specification, for example, at page 7, lines 11-18. No new matter has been added.

Rejections Under 35 U.S.C. § 112

Claims 21-23 are rejected under 35 U.S.C. § 112, second paragraph. Applicant disagrees that claims 21-23 are indefinite.

A “predetermined quantity” or “a suspended solids content sufficient to allow it to be returned” to either the impure water source or to the ocean is a specific concentration or limit that can be typically determined or chosen by a user of the method or the controller of the system. The concentration or limit may also be a value or range of values set by regulations. In the present application, for example, one skilled in the art would determine the quantity of suspended solids in the reverse osmosis reject that would be sufficient to allow it to be returned to an impure water source. (See Application at page 5, lines 6-9.) Similarly, one skilled in the art would be able to readily define a “sufficient” suspended solids content for allowing it to be returned to either the impure water source or the ocean because it can be the content, for example, that provides discharge levels that may not be exceeded by regulations. (See Application at page 8, lines 9-16.) In the present application, for example, one skilled in the art would determine the “sufficient” suspended solids content because, given that the total suspended solids are a function of the feed water, and that the discharge levels are regulated by permit, the overall recovery of the plant may be controlled such that the discharge levels would not be exceeded. (See Application at page 8, lines 9-16.) In certain circumstances, the reverse osmosis reject may be discharged to the ocean or other receiving body of water, for example, at a concentration of 30-50 mg of suspended solids per liter of wastewater. (See Application at page 8, lines 3-6.)

Therefore, claims 21-23 are definite. Accordingly, reconsideration and withdrawal of rejections of claims 21-23 under 35 U.S.C. § 112, second paragraph is respectfully requested.

Rejections Under 35 U.S.C. § 102

Claims 1-2, 6-7, 10, 16-17, and 20 are rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Daly, et al. in U.S. Patent No. 6,120,688 (hereinafter “Daly”). Applicant disagrees with this rejection because Daly fails to teach each and every limitation recited in independent claims 1 and 20.

Daly does not disclose the present invention as recited in amended claim 1. Specifically, Daly at least does not disclose a method of purifying impure water comprising, in part, the steps of filtering the residual reverse osmosis stream by passing the stream through a secondary microfiltration or ultrafiltration membrane filter to produce a filtered saline solution, as recited in independent claim 1.

Additionally, Daly does not disclose the present invention as recited in claim 20. Specifically, Daly at least does not disclose a method of facilitating the purification of impure water, the method comprising, in part, providing a secondary microfiltration or ultrafiltration unit to produce a filtered saline solution, as recited in claim 20.

The teaching of Daly discloses a method of purifying impure water using an apparatus, comprising the steps of providing a microfiltration unit, at least one reverse osmosis unit and a clean-in-place (CIP) tank containing concentrated retentate. The concentrated retentate is filtered through a ten micron filter, which is very different from an ultrafiltration or microfiltration unit, and is used to backwash the microfiltration unit. (Daly at col. 2, line 55 – col. 3, line 21; and col. 6, lines 45-67.)

In support of that difference, the Declaration of Joseph Edward Zuback under 37 CFR § 1.132 (hereinafter “Declaration”) offers instruction as to the differences between the present invention and Daly. The purpose of the ten micron filter of Daly is to protect the reverse osmosis membrane(s). (Declaration at paragraph no. 4.) Daly does not recognize or even acknowledge that materials may originate, or be formed within the reverse osmosis membrane modules. (Declaration at paragraph no. 5.) Daly also does not recognize that there may be a need to filter out these materials, as a ten micron filter is too coarse to perform this function. (Declaration at paragraph nos. 4-5.) The materials may take the form of flocculants or particles created by certain dissolved solids that are concentrated in the retentate and that will exceed their solubility causing precipitates to form. In addition or in the alternative, these materials may be bacterial colonies that grow and eventually detach from the membrane and enter the retentate

stream. (Declaration at paragraph no. 7; and Application at page 2, lines 7-20.) Thus, the ten micron filter of Daly is not equivalent and cannot operate as the secondary microfiltration or ultrafiltration membrane filter as presently claimed. That is, Daly does not disclose the secondary microfiltration or ultrafiltration unit used to produce a filtered saline solution. Therefore, independent claims 1 and 20 are not anticipated by the teaching of Daly.

Dependent claims 2, 6-7, 10, and 16-17, which depend directly or indirectly from independent claim 1, are not anticipated by the teaching of Daly for at least the reasons stated above.

Therefore, for at least the reasons stated above, claims 1-2, 6-7, 10, 16-17 and 20 are novel over the teaching of Daly.

Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102 is respectfully requested.

Rejections Under 35 U.S.C. §103

Dependent claims 3 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claims 1 and 17.

Applicant disagrees that dependent claims 3 and 18, as amended, would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claims 1 and 17. As discussed above, Daly does not disclose a method comprising, in part, the step of filtering the residual reverse osmosis stream by passing the stream through a secondary microfiltration or ultrafiltration membrane filter to produce a filtered saline solution, as recited in claim 1, from which claims 3 and 18 depend. Because Daly does not disclose the secondary microfiltration or ultrafiltration membrane filter as presently claimed, Daly cannot disclose the additional elements of backwashing a secondary microfiltration or ultrafiltration membrane filter, as recited in amended dependent claim 3, or filtering through a coarse filter prior to filtering through the secondary microfiltration or ultrafiltration membrane filter, as recited in amended dependent claim 18.

One skilled in the art would not have modified the method and apparatus of Daly by substituting a microfiltration or ultrafiltration unit for the ten micron filter used in Daly. Daly does not recognize or even acknowledge the need for a secondary microfiltration or ultrafiltration membrane filter to produce a filtered saline solution for the purpose of

backwashing the microfiltration unit. (Declaration at paragraph nos. 5 and 9.) One of ordinary skill in the art would recognize the differences between a ten micron filter as used in Daly, and the secondary microfiltration or ultrafiltration membrane filter as used in the present invention. Ten micron filters are relatively inexpensive products, which can be replaced frequently without concern of an overall increase in operating costs of the filtration unit. One of ordinary skill in the art would use a ten micron filter if it was believed that large particles were to be filtered out through its use to protect the reverse osmosis membranes. One of ordinary skill in the art would not use a secondary microfiltration or ultrafiltration membrane filter in place of the ten micron filter due at least to the increased cost of operation and replacement.

In contrast, the present Applicant understood the benefit of using a secondary microfiltration or ultrafiltration membrane filter to prevent damage to the clean side of the primary microfiltration or ultrafiltration unit during backwashing, and by extension to protect the reverse osmosis membrane. By filtering the retentate to a greater degree using a finer membrane filter, the present invention prevents particles from fouling the clean side of the primary membrane filter, which would decrease the efficiency of the purification unit. Therefore, contrary to conventional wisdom that use of a secondary microfiltration or ultrafiltration unit would increase operational and replacement costs, Applicant has learned that this investment enhances efficiency over the life of the overall filtration system. For at least these reasons, dependent claims 3 and 18 which depend directly or indirectly from claim 1, are not obvious over Daly.

Accordingly, reconsideration and withdrawal of the rejection of dependent claims 3 and 18 under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 4 and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Marius et al. in U.S. Patent No. 5,059,317 (hereinafter "Marius").

The rejection is improper because no proper *prima facie* case of obviousness has been established. Moreover, any *prima facie* case of obviousness is rebutted because the teachings of Daly and Marius fail to disclose, teach or suggest a method of purifying impure water comprising, in part, the steps of filtering the residual reverse osmosis stream by passing the

stream through a secondary microfiltration or ultrafiltration membrane filter to produce a filtered saline solution, as recited in claim 1, from which amended claims 4 and 5 depend.

One skilled in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. As noted above, Daly does not disclose a method comprising, in part, the steps of filtering the residual reverse osmosis stream by passing the stream through a secondary microfiltration or ultrafiltration membrane filter to produce filtered saline solution, as recited in independent claim 1, from which dependent claims 4 and 5 depend. As explained above, the ten micron filter of Daly that is used to filter the retentate prior to backwashing the microfiltration unit is not the same as the secondary microfiltration or ultrafiltration unit used to filter the retentate prior to backwashing the microfiltration or ultrafiltration unit as in the present invention. Further, Daly does not acknowledge the benefits of protecting the primary microfiltration or ultrafiltration membrane filter from particles that form as a result of the reverse osmosis process, as in the present invention.

The teaching of Marius does not cure the deficiencies of Daly. Marius discloses an apparatus for filtering drinking water using a cartridge filter or a mixed bed ion exchange device. (Marius at col. 1 at line 68 to col. 2, line 2.) Marius does not disclose a method comprising, in part, the steps of filtering the residual reverse osmosis stream by passing the stream through a secondary microfiltration or ultrafiltration membrane filter (polish) to produce a filtered saline solution, as recited in independent claim 1, from which claims 4 and 5 depend. Marius also does not disclose a method using a cartridge filter as a secondary filter to produce a filtered saline solution, or wherein the secondary filter is backwashed as recited in dependent claims 4 and 5.

One of ordinary skill in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. While Daly uses a ten micron filter to provide a filtered retentate, Marius uses an ion exchange device to further filter a filtrate to provide drinking water. Therefore, one of ordinary skill in the art looking to use retentate from a reverse osmosis unit to backwash a microfiltration unit would not have been motivated to modify the teachings of Daly with an ion exchange device that filters the filtrate to provide drinkable water.

Even if the teachings of Daly and Marius were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Marius would have produced a method and apparatus for treating contaminated water comprising a microfiltration device and at least one reverse osmosis device. The retentate would be directed

through a ten micron filter to be used for backwashing. The filtrate of the reverse osmosis device would be further treated by an ion exchange device. Therefore, the combination of the teachings of Daly and Marius do not teach each and every limitation of dependent claims 4 and 5.

Accordingly, reconsideration and withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claims 11-15, 19, 25, and 27-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Water Encyclopedia (Jay Lehr, editor, John Wiley & Sons, Inc., New York, 2005) (hereinafter "Encyclopedia.")

Applicant disagrees that claims 11-15, and 19 would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claim 1, and further in view of the teaching of Encyclopedia. Applicants also disagree that independent claim 25 and claims 27-34 which depend therefrom would have been obvious to one of ordinary skill in the art over the teaching of Daly and further in view of the teaching of Encyclopedia. These rejections are improper because no *prima facie* case of obviousness has been established. Further, any *prima facie* case of obviousness is rebutted because the alleged combination would lack at least one recited element.

One skilled in the art would not have been motivated to combine the teaching of Daly with the teaching of Encyclopedia. As noted above, there is no teaching in Daly to further purify the retentate from the reverse osmosis membrane to provide drinkable water because the retentate portion is desired for backwashing. In contrast, the various chemical, radiation, and physical treatments taught in Encyclopedia are intended to further purify the stream to provide drinkable water. One of ordinary skill in the art looking to use a reverse osmosis retentate to backwash a microfiltration unit as in Daly would not have been motivated to then treat the retentate to purify and enhance it, as suggested by the Examiner. Additionally, the deficiencies of Daly are not cured by the teaching of Encyclopedia. Encyclopedia does not disclose, teach or suggest a method, as recited in claims 11-15, and 19, or a system as recited in claims 25, and 27-34. Therefore, the combined teachings of Daly, in view of Encyclopedia would have failed to teach each and every claimed element.

Even if the teachings of Daly and Encyclopedia were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Encyclopedia would have produced a method and apparatus for treating contaminated water comprising a microfiltration device, and at least one reverse osmosis device. The retentate would be directed through a ten micron filter to be used for backwashing. The filtrate of the reverse osmosis device would be further treated by the various water treatments disclosed in Encyclopedia to provide drinkable water. Therefore, the combination of the teachings of Daly and Encyclopedia do not teach each and every limitation of claims 11-15, 19, 25, and 27-34.

For at least the reasons mentioned above, claims 11-15, 19, 25, and 27-34 would not have been obvious over the teaching of Daly as applied to claim 1 and further in view of Encyclopedia.

Accordingly, reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, reconsideration is respectfully requested. This application should now be in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762 (Ref. No. M2019-7022US).

Respectfully submitted,
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